

Data Communications: Key to Modern Decentralized Business

A tight communications link between home and branch offices is essential for efficient operations in today's fast-breaking business climate. Much vital information, essential for executive decisions, must be transmitted between offices over telecommunication wires. For fast, accurate confirmed data, the telephone is inadequate, while the conventional teletypewriter and the mails, are too slow.

Studies have shown that for most businesses a medium-speed system is required. Not only is it more than adequate to handle today's loads, it is less costly to install, significantly less expensive to operate and can be expanded at low cost as needs demand.

This brochure explains the cost savings that can be achieved with the UNICOM SYSTEMS. We hope it will convince you to request a visit by your INVAC Data Communications Representative. Once requirements are established we can show that a UNICOM System will be the most efficient communication link between your home and branch offices.

Where large quantities of technical information must be transmitted, the time expended in oral telephone dictation is many times wasted by the inaccuracies resulting from lack of understanding. Yet, data must be transmitted, NOW.

Conventional teletypewriter systems (operating at 6 or 10 characters per second) do not fully exploit the capability of intercity transmission facilities. Today, when faster systems can send the same data

for fewer dollars and in less time or send far more data for the same price, faster data communication systems soon offset their somewhat higher purchase cost in reduced telephone facility charges, alone.

There is a practical limit to speed, however, since the costs for leased auxiliary ("interface") apparatus increases markedly with transmission speed capability. In many situations, companies which have purchased high-speed data communications systems, are paying for capacity they do not need.

To meet the needs of practical data communication requirements, INVAC Corporation has developed UNICOM SYSTEMS compatible with the standard Bell System Data-Phone Equipment. Serial UNICOM Systems use Data-Phone Sets, Model 103A (one at each end of each line for transmission and/or reception). Parallel UNICOM Systems use Data-Phone Sets, Model 402C (for transmission, only) and Model 402D (for reception, only).

Systems, within a building complex, may be established without Data-Phone Equipment. Such systems are extremely practical for operations which require duplicate data, simultaneously, in several locations. For instance, transcription errors are minimized in purchasing systems, when repeated data is stored on tape and "replayed" rather than retyped manually. Such systems can be tied in with standard intercity Data-Phone connected loops for quick communication with other offices (for inventory checks, as an example) or to other organizations equipped for data communications.

UNICOM / 30 — An example of how INVAC systems provide More Data Per Dollar

Considerations that optimize transmission speed, data load and system operating costs in Serial UNICOM/30 Systems.

Why 30 Characters Per Second was selected for UNICOM/30

Two important items are pertinent to Data Communications Speed:

- 1 The amount of data you will send each day over a period of months.
- 2 The operating costs for telephone facilities.

DAILY DATA LOAD

Data Communication systems speak of message lengths in terms of "characters" rather than words, since words have such varied lengths. A "character" is a letter, a number, a punctuation mark or space between words (or certain machine instructions such as "carriage return", etc.). A "rule-of-thumb" sets an average of 6 characters per word. That is, 30 characters constitute 5 words; a speed of 30 characters per second is equivalent to 5 words per second or 300 words per minute.

The daily data load for any particular station may be estimated with sufficient accuracy by preparing a sample (average length) message on a standard typewriter according to the following format:

Format: Set the typewriter margins at 30 (left) and 80 (right) or any other setting to obtain a 50-character line. Now type the message and count the number of lines. Multiply the number of lines by 50 to obtain the number of characters in the message.

Be sure to use a realistic "average" message, one that would be reasonable for a long-run daily requirement. Do not use a longer than average message to take care of "peak" loads, because such loads do not represent the typical message. Consideration of peak loads can result in estimates that would indicate more expensive apparatus than is actually needed.

TELEPHONE FACILITY COSTS:

There are three basic Telephone Company charges associated with data communication systems.

- 1 Installation of "Data-Phone Interface" apparatus.
- 2 Monthly rental of "Data-Phone Interface" apparatus.
- 3 Per-message charge for telephone lines.

UNICOM Systems fully exploit transmission facilities by using the lowest cost Data-Phone apparatus for the applicable speed range. This feature is an important part of the savings afforded by UNICOM Data Communication Systems.

CHART 1

Comparing System Operating Costs.

SIX MONTH OPERATING COSTS of four two-way Data Communication systems sending similar daily messages are compared in Chart ONE. Steep lines at left are for conventional 6- and 10-cps* teletypewriter systems; heavy black line is 75-cps parallel system and orange line is 30-cps UNICOM/30, a serial system. Arrows show that 6-months costs for daily messages of 27,500 characters (4,584 words) amount to \$790 for 75-cps system and only \$670 for UNICOM/30. This is a saving of about \$240 per year per station. Since systems can include hundreds of stations, these savings are significant. For long-distance rate at which systems are compared (see accompanying note) UNICOM/30 remains lowest cost system up to 39,000 characters where an "Equal Cost Point" (ECP) is reached with 75-cps system. Equal Cost Point varies with different line rates; see Chart TWO for ECP's for other long-distance Telephone rates.

NOTE:

Accumulated costs are based on (1) Installation of appropriate Data-Phone (or equivalent) equipment, (2) Rental of Data-Phone (or equivalent) equipment and (3) Use of Telephone lines, appropriate for systems, between two cities where the standard service long-distance rate is \$0.25 per minute (\$0.75 minimum for three minutes). Data-Phone costs are for single branch offices only, typifying a multi-station network where pro-rated costs for central office Data-Phone equipment would add an insignificant percentage to cost figures. All Telephone Company charges are less taxes and are based on Boston rates for 1965. Dollars are total operating costs to send similar daily messages over six-month period following installation. Message length ("Characters" along bottom of chart; "words" along top) range from 0 to 40,000 characters (6,666 words). Transmission times for various message lengths appear along each system "line".

*Characters per second.

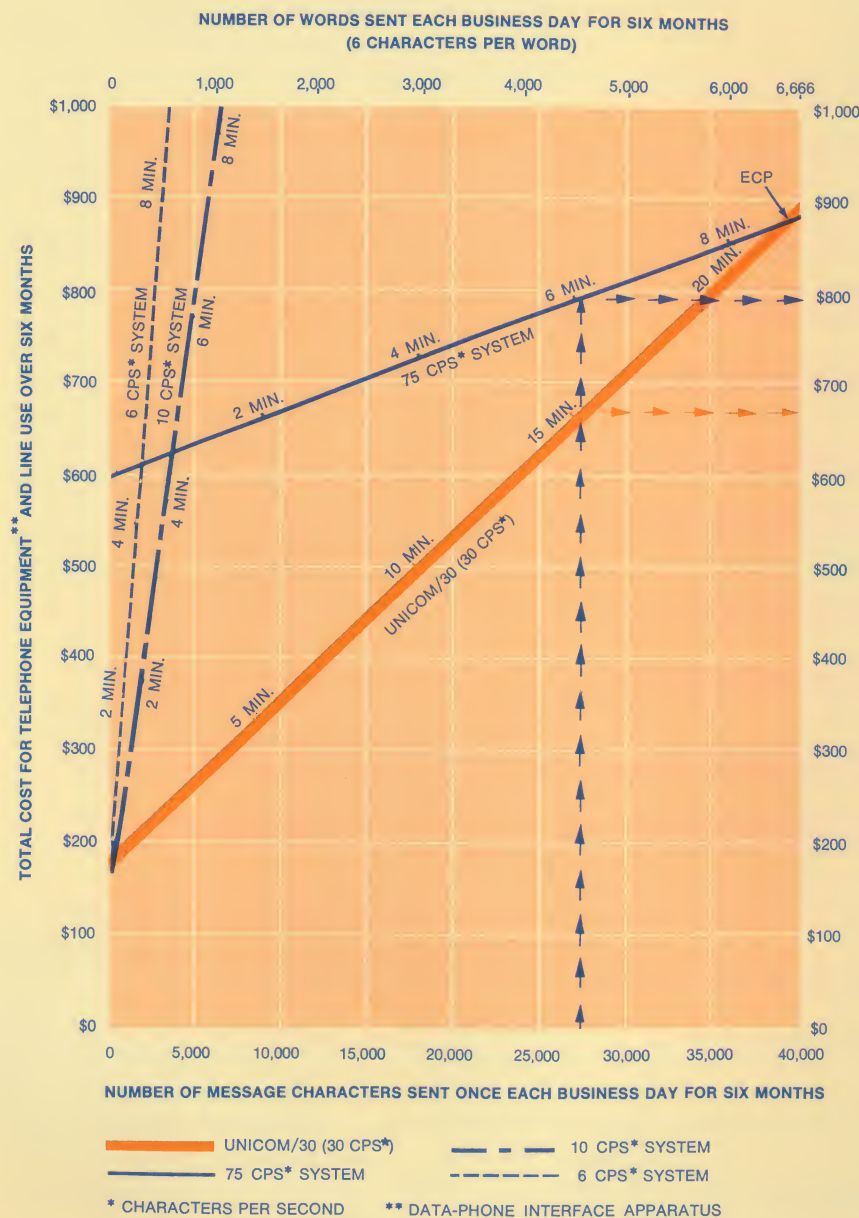


CHART 2

How Long Distance Rates Affect "Equal Cost Point".

"EQUAL COST POINT" INCREASES dramatically as long-distance rates are reduced with shorter transmission distances. Chart TWO covers virtually every station-to-station telephone rate in the United States (including taxes). For example: If the 3-minute telephone line charge is \$0.50 (including tax), the number of characters in the daily data load on Chart ONE would rise to approximately 60,000 before the "Equal Cost Point" is reached. Chart TWO is based on six months of daily operation of UNICOM/30 and a 75-cps system starting with installation. Figures include only cost of installation and use of Data-Phone Interface Apparatus and telephone line use for a single station on a multistation system that uses shared Data-Phone facilities at the main office.

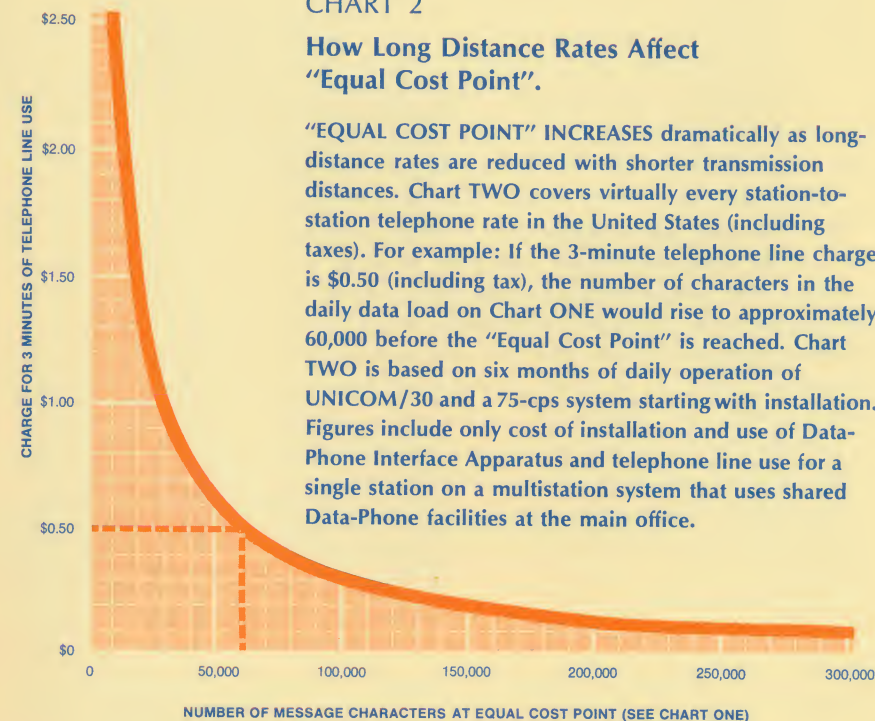


Chart TWO shows that the UNICOM/30 is ideally rated for local Data-Phone Service where distances are short and message lengths are long. UNICOM/30 is also directly applicable where a local network must make occasional "long-distance" calls. The importance of this "Equal Cost Point" concept cannot be overemphasized if your company seeks: MORE DATA PER DOLLAR.

In applications where other operating speeds seem appropriate, INVAC provides other UNICOM Systems. For more complete information of this rather complex subject, we recommend that you discuss the finer points of applying UNICOM to your data communication problem with your local INVAC Representative.

"UNICOM Means MORE DATA PER DOLLAR".

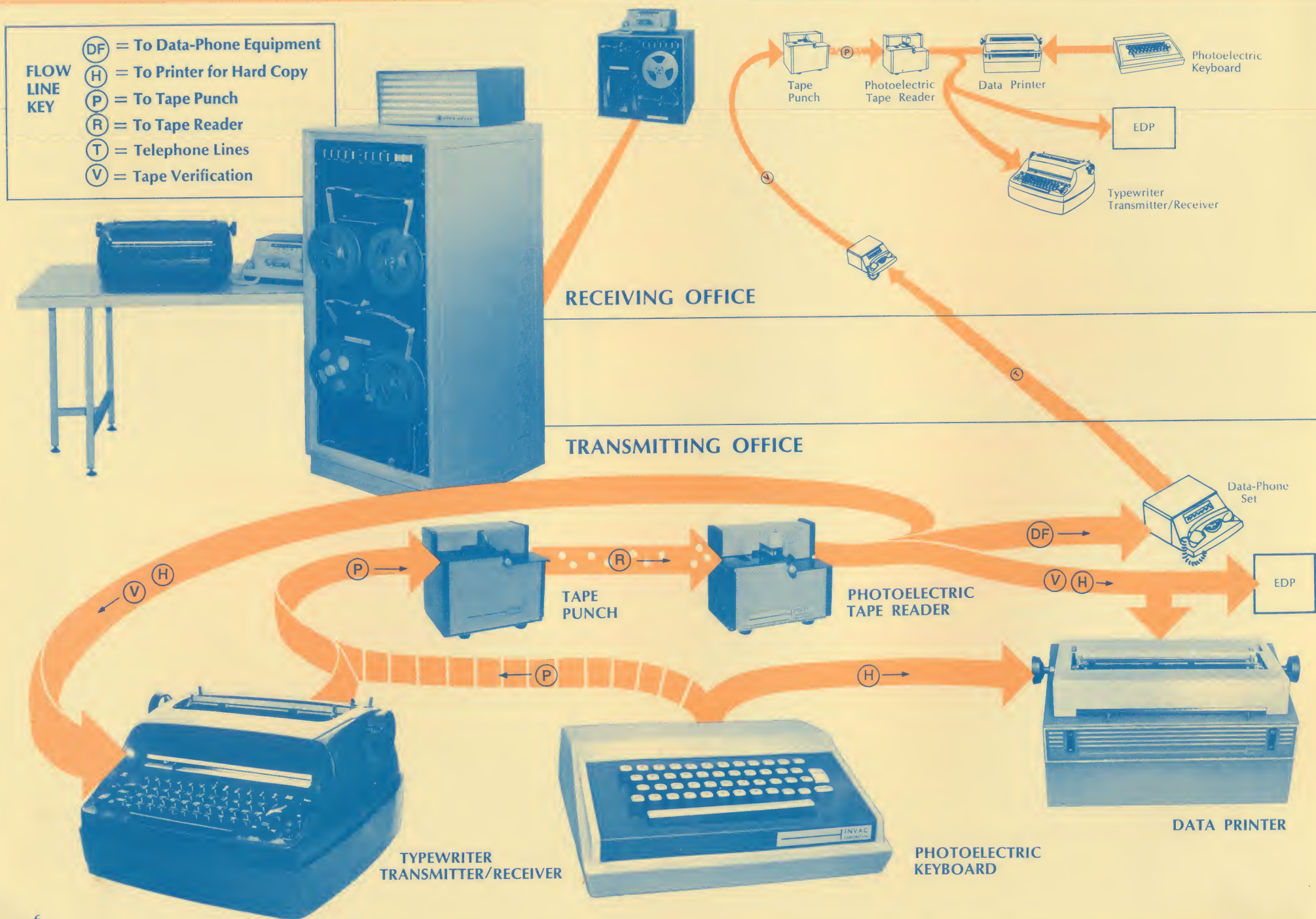
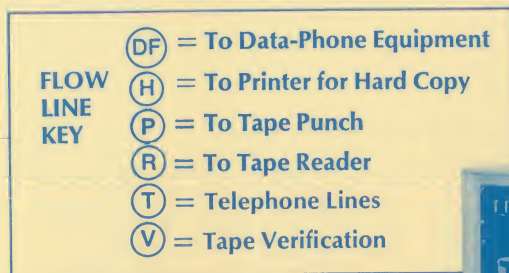


CHART 3

Transmission-Reception Chart of Typical UNICOM/30 System

UNICOM/30 Equipments are related in "Transmission-Reception" Chart of a typical system. Message "flows" from left to right (one-way system shown for clarity). Functions start with hand-typed message on Transmitting-Office "Typewriter Transmitter/Receiver" which feeds coded electrical signals to Transmitting-Office "Tape Punch". (Note: Alternate System might have used "Photoelectric Keyboard" and "Data Printer" combination in place of the Typewriter Transmitter/Receiver.) Punched tape, taken from Tape Punch, is placed on Transmitting-Office "Photoelectric Tape Reader" which then feeds coded signals to any or all of three points:

- 1 Back to Typewriter Transmitter/Receiver for tape verification.
- 2 To local Electronic Data Processor (E.D.P.), when applicable.
- 3 To Receiving-Office over Data-Phone Set and telephone wires.

At Receiving Office, another Data-Phone Set feeds incoming signals to Receiving-Office Tape Punch that duplicates tape originally made at Transmitting Office. (Data-Phone Set may also feed Receiving-Office E.D.P., if applicable.) When new tape passes through Receiving-Office Photoelectric Tape Reader, electrical signals are produced for conversion into "hard-copy" (printed pages) by Receiving-Office Typewriter Transmitter/Receiver (or Photoelectric Printer). Same Tape Reader signals may be connected to Receiving-Office E.D.P., if applicable.

Two-Way System would have transmitting and receiving connections made at both offices. Descriptions of individual UNICOM System Equipments appear at the right.

UNICOM/ 30 Interoffice Data Communications Equipment

Several equipments that are used in UNICOM/30 FAMILY Inter-office Data Communications System are shown, below. Since this brochure is primarily devoted to showing how these are combined to meet specific data communications problems, internal technical characteristics have been abridged, considerably. Therefore, each description includes reference to a detailed technical description which is available upon request. You may use the enclosed reply card.

TYPEWRITER TRANSMITTER/RECEIVER

Series 200 is a complete two-way automatic typewriter, for both on-line and off-line applications, that produces photoelectrically-generated coded characters at any convenient typing speed. "Hard-Copy" (typed words on paper) is provided for both transmission and reception. Carriage widths of 8½" and 13" are available. For more data, check "Typewriter Transmitter/Receivers" on reply card.

TAPE PUNCH

Model P-135, uses a solenoid-actuated perforator. For 5, 6, 7 or 8-hole codes, Model P-135 operates at rates from 0 to 35 characters per second. Tape widths of 11/16-inch to 1-inch may be used. For more data, check "Tape Punch" on reply card.

PHOTOELECTRIC TAPE READER

Model R-110, reads 5, 6, 7 or 8-hole perforated tapes at rates from 0 to 35 characters per second. Any standard tape may be used. A solenoid-actuated tape transport mechanism is used. Another INVAC

Reader, the Model R-125 has speeds up to 125 characters per second. For more data on these Readers, check "Tape Reader" on reply card.

PHOTOELECTRIC KEYBOARD

Models PK-144 (shown) and **PK-164**, are alpha-numeric keyboards with up to ten light data channels. They generate any binary code up to eight bits per character. The Model PK-144 has 45 keys; the Model PK-164 has 63 keys including space bar, shift, carriage return and several extra function keys. Both keyboards have standard typewriter "feel". For more data, check "Photoelectric Keyboard/Tape Makers" on reply card.

DATA PRINTER

Model SP-16, receives and prints data at rates up to a nominal 15.5 characters per second. Ideal for applications where extra receiving stations are required for simultaneous reception of incoming data. No transmitting keyboard. For more data, check "Typewriter Transmitter/Receivers" on reply card.

Another important advantage for the user of UNICOM is the Typewriter Transmitter/Receiver which may be used as a conventional electric typewriter for ordinary correspondence when not preparing tape or "hard copy". The unit has all of the typing characteristics of a standard typewriter.

Still another use for this versatile Typewriter Transmitter/Receiver is the preparation of mass mailing letters. By merely pretaping the letter in advance, the UNICOM Typewriter Transmitter/Receiver will repeat the same letter as often as required. Address and salutation are the only manual operations required.

The Company behind UNICOM

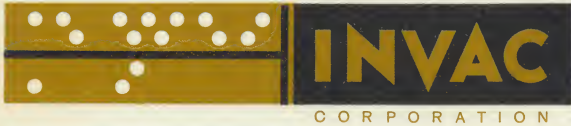
Backing up the UNICOM is a field force of experienced INVAC Data Communication Engineers, ready to provide preventive maintenance and emergency service. A reliable system that is inexpensive to install and operate is the reason why, with UNICOM you get MORE DATA PER DOLLAR.



C O R P O R A T I O N

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March 25, 1966

Mr. T. Nelson
Systems Consultant
Box 1546
Poughkeepsie, N.Y. 12603

Dear Mr. Nelson,

Thank you for your inquiry relative to Invac Unicom Systems.
Enclosed you will find a brochure describing this system.

We would be pleased to receive information and/or specifications
pertaining to your application.

Thank you for your interest in our organization and if we can be
of additional assistance to you, please contact us.

Very truly yours,

INVAC CORPORATION

Richard E. Williamson/aw

Richard E. Williamson
Sales Manager

REW:aw

Enclosure: Unicom Brochure